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SPECIFICATION FOR BOILER RIVETS (12 TO 48 mm DIAMETER)

(Fifth Reprint MARCH 1984)

UDC 621·884 : 621·18

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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SPECIFICATION FOR BOILER RIVETS (12 TO 48 mm DIAMETER)

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SPECIFICATION FOR BOILER RIVETS (12 TO 48 mm DIAMETER)

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 17 October 1961, after the draft finalized by the Screw Threads Sectional Committee had been approved by the Engineering Division Council.

0.2 This standard is one of a series of Indian Standards being prepared by the Institution on metric screw threads and fasteners. This standard deals with mild steel rivets intended for use in the construction of boilers. The question of preparing a similar standard for high tensile rivets for boiler construction is under consideration.

0.3 At the level of the International Organization for Standardization (ISO), the Technical Committee, ISO/TC 7 Rivets, has at present under consideration a proposal to unify the metric and inch sizes of rivets by considerably modifying the tolerance on the shank diameter of rivets. However, for obvious reasons, international agreement on the subject is likely to take time to materialize.

0.4 Wherever a reference to any standard appears in this specification, it shall be taken as a reference to the latest version of the standard.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960 Rules for Rounding Off Numerical Values (*Revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

0.6 Metric system has been adopted in India and all dimensions and quantities in this standard have been given in this system.

0.7 This standard is intended chiefly to cover the technical provisions relating to boiler rivets, and it does not include all the necessary provisions of a contract.

1. SCOPE

1.1 This standard prescribes the requirements for boiler rivets, 12 to 48 mm in diameter.

2. MATERIAL

2.1 The rivets shall be manufactured from material conforming to IS : 1990-1962 Specification for Steel Rivets and Stay Bars for Boilers.

3. MANUFACTURE

3.1 Rivets may be made either by cold heading or by hot forging. If rivets are made by the cold-heading process they shall subsequently be adequately heat-treated so that the stresses set up in the cold-heading process are eliminated. If they are made by hot-forging process, care shall be taken to see that the finished rivets cool gradually.

4. FREEDOM FROM DEFECTS

4.1 The rivets shall be cleanly finished with heads concentric with the shanks. They shall be free from imperfections and heavy scales. The ends of rivets shall be square, cleanly sheared and free from rag or burr.

5. DIMENSIONS

5.1 Length-Diameter Combinations — The preferred length and diameter combinations of rivets shall be as given in Table I.

5.2 Diameters of Rivets and Rivet Holes — The diameters of rivets and corresponding rivet holes shall be as specified in Table II.

5.3 Dimensions of Rivet Heads — The heads of rivets shall conform to the proportions, in terms of the nominal diameter, shown in Fig. 1 to 11 (*see* P 8 and 9).

6. TOLERANCES

6.1 Shank Diameter

6.1.1 *Nominal Diameters (D) 12 to 24 mm*

6.1.1.1 For rivets, five diameters long and under, the following tolerances shall apply (*see* Fig. 10):

a) At position *X*	+0·3 mm −0·1 mm
b) At position *Y*	+0·0 mm −0·5 mm

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*Since revised.

TABLE I PREFERRED LENGTH AND DIAMETER COMBINATIONS FOR RIVETS

(*Clause* 5.1)

(All dimensions in millimetres)

Length	Diameter													
	12	14	16	18	20	22	24	27	30	33	36	39	42	48
28	×	—	—	—	—	—	—	—	—	—	—	—	—	—
31·5	×	×	—	—	—	—	—	—	—	—	—	—	—	—
35·5	×	×	×	—	—	—	—	—	—	—	—	—	—	—
40	×	×	×	×	—	—	—	—	—	—	—	—	—	—
45	×	×	×	×	×	—	—	—	—	—	—	—	—	—
50	×	×	×	×	×	×	—	—	—	—	—	—	—	—
56	×	×	×	×	×	×	×	—	—	—	—	—	—	—
63	×	×	×	×	×	×	×	×	—	—	—	—	—	—
71	×	×	×	×	×	×	×	×	×	—	—	—	—	—
80	×	×	×	×	×	×	×	×	×	—	—	—	—	—
85	—	×	×	×	×	×	×	×	×	×	—	—	—	—
90	—	×	×	×	×	×	×	×	×	×	—	—	—	—
95	—	×	×	×	×	×	×	×	×	×	×	—	—	—
100	—	—	×	×	×	×	×	×	×	×	×	—	—	—
106	—	—	×	×	×	×	×	×	×	×	×	×	—	—
112	—	—	×	×	×	×	×	×	×	×	×	×	—	—
118	—	—	—	×	×	×	×	×	×	×	×	×	×	—
125	—	—	—	—	×	×	×	×	×	×	×	×	×	×
132	—	—	—	—	—	×	×	×	×	×	×	×	×	×
140	—	—	—	—	—	×	×	×	×	×	×	×	×	×
150	—	—	—	—	—	—	×	×	×	×	×	×	×	×
160	—	—	—	—	—	—	×	×	×	×	×	×	×	×
180	—	—	—	—	—	—	—	×	×	×	×	×	×	×
200	—	—	—	—	—	—	—	—	×	×	×	×	×	×
224	—	—	—	—	—	—	—	—	—	×	×	×	×	×
250	—	—	—	—	—	—	—	—	—	—	—	—	×	×

NOTE — Preferred combinations are indicated by ×.

Designation Example:

Snap Head Boiler Rivet 20 × 90 (IS : 1928-1961).

---

c) Anywhere between positions *X* and *Y*	Diameter not to be greater than the maximum diameter at position *X* nor less than the minimum diameter at position *Y*
d) Out of roundness at any cross section	Not more than 0·2 mm within the sizes resulting from the tolerances mentioned in (a), (b) and (c)

TABLE II RIVET HOLE DIAMETERS AND TOLERANCES ON THE HE

(*Clauses* 5.2 *and* 6.3)

(All dimensions in millimetres)

Basic Size of Rivet *D*	Rivet Hole Diameter *Min*	Tolerances on			
		Diameter of Head		Height of Head	Permissible Eccentricity of Head (*a-b* in Fig. 12)
		CSK head both types (Fig. 7 and 8)	All other types of head (Fig. 1 to 6 and 9)		
12	13·0	±0·35	±1·2	+0·8 −0·0	0·7
14	15·0	±0·4	±1·2	+0·8 −0·0	0·7
16	17·0	±0·5	±1·2	+0·8 −0·0	0·8
18	19·0	±0·5	±1·2	+0·8 −0·0	0·8
20	21·0	±0·8	±1·2	+1·2 −0·0	0·9
22	23·0	±0·8	±1·2	+1·2 −0·0	1·1
24	25·0	±0·8	±1·2	+1·2 −0·0	1·3
27	28·5	±0·8	±1·2	+1·2 −0·0	1·5
30	31·5	±0·8	±1·2	+1·6 −0·0	1·6
33	34·5	±0·8	±1·2	+1·6 −0·0	1·6
36	37·5	±1·6	±1·2	+1·6 −0·0	1·8
39	41·0	±1·6	±1·2	+1·6 −0·0	1·8
42	44·0	±1·6	±1·2	+1·6 −0·0	2·0
48	50·0	±1·6	±1·2	+1·6 −0·0	2·0

6.1.1.2 For rivets above five diameters in length, the following tolerances shall apply (*see* Fig. 11):

a) At position *X*	+0·3 mm −0·1 mm
b) At position *Y*	+0·0 mm −0·5 mm
c) At position *Z*	+0·0 mm −0·5 mm

d) Between positions *X* and *Y*	Diameter not greater than the maximum diameter at position *X* nor less than the minimum diameter at position *Y*
e) Between positions *Y* and *Z*	+0·0 mm −0·5 mm
f) Out of roundness at any cross section	Not more than 0·4 mm within the sizes resulting from the tolerances mentioned in (a), (b), (c), (d) and (e)

6.1.2 *Nominal Diameters* (*D*) *Above* 24 *mm Up to* 48 *mm* — The following tolerances shall apply (*see* Fig. 10 and 11):

a) At position *X*	+0·6 mm −0·2 mm Where specifically ordered, for rivets up to 33 mm diameter, the tolerance shall be +0·3 mm −0·1 mm
b) At position *Y*	+0·0 mm −1·0 mm
c) At position *Z* (in case of rivets longer than 5*D*, *see* Fig. 11)	+0·0 mm −1·0 mm
d) Between positions *X* and *Y*	Diameter not to be greater than the maximum value at position *X* nor less than the minimum value at position *Y*
e) Between positions *Y* and *Z*	+0·0 mm −1·0 mm
f) Out of roundness at any cross section	Not greater than 0·4 mm within the sizes resulting from the tolerances mentioned in (a), (b), (c), (d) and (e)

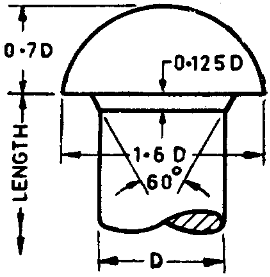


Fig. 1 Snap Head

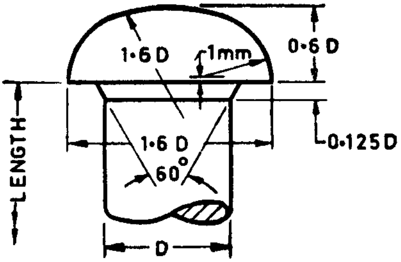


Fig. 2 Ellipsoid Head

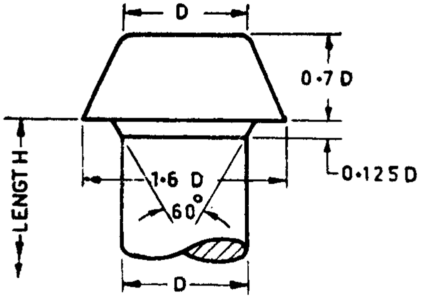
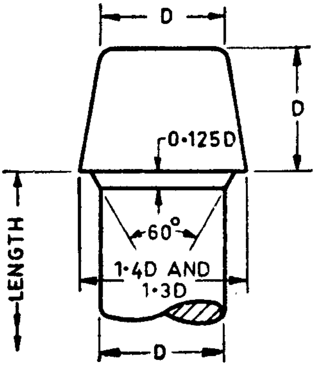


Fig. 3 Pan Head, Type 1



1·4*D* For Rivets under 24 mm
1·3*D* For Rivets 24 mm and over

Fig. 4 Pan Head, Type 2

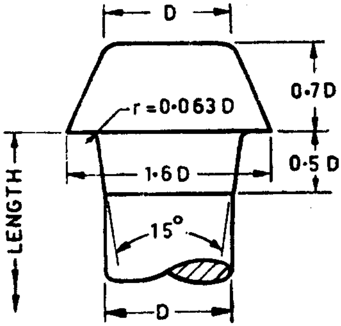


Fig. 5 Pan Head with Tapered Neck

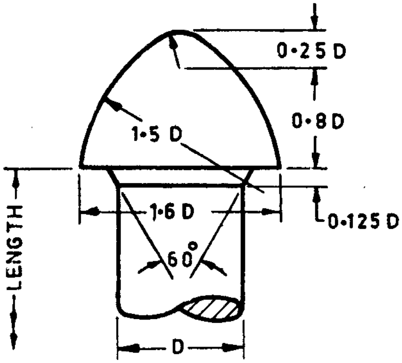


Fig. 6 Conical Head

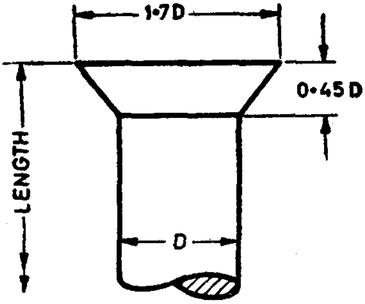


FIG. 7 COUNTERSUNK HEAD

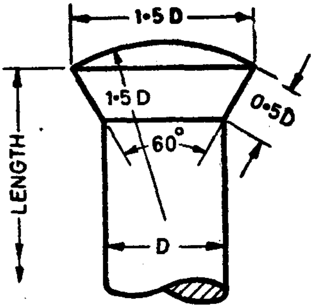


FIG. 8 ROUNDED COUNTERSUNK HEAD

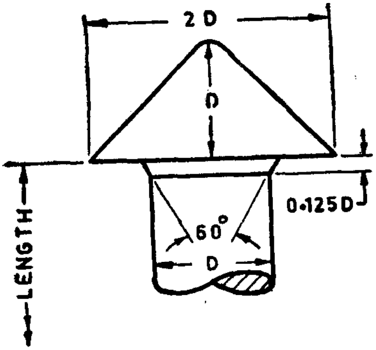


FIG. 9 STEEPLE HEAD

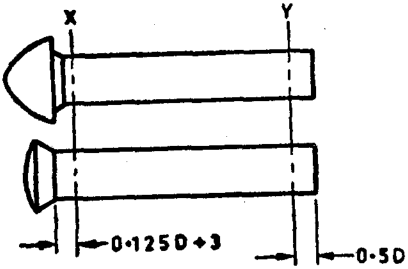


FIG. 10 RIVETS FIVE DIAMETERS LONG AND SHORTER

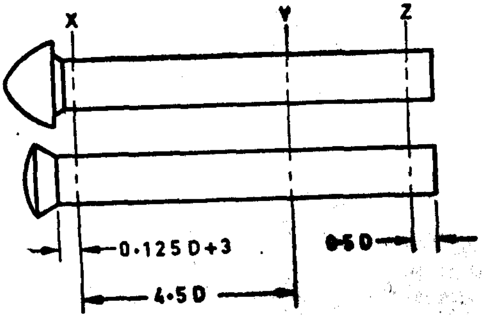


FIG. 11 RIVETS LONGER THAN FIVE DIAMETERS

6.2 Length — The tolerance on the length of the rivets shall be as follows:

NOMINAL DIAMETER mm	TOLERANCE mm
Up to 20	+1·5 −0·0
20 to 30	+2·0 −0·0
Above 30	+2·5 −0·0

6.3 Tolerance on other dimensions of rivets shall be as given in Table II.

6.3.1 The maximum inclination *G* (*see* Fig. 12) of the head shall not exceed two degrees.

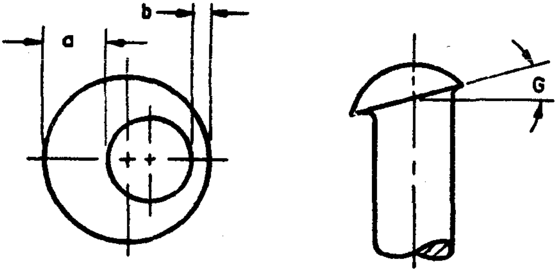


FIG. 12 TOLERANCE ON RIVET HEAD DIMENSIONS

7. TESTS FOR FINISHED RIVETS

7.1 Sampling — The method of sampling shall be mutually agreed upon between the supplier and the purchaser.

NOTE — A recommended method of sampling is under consideration.

7.2 Tests

7.2.1 *Bend Test* — The rivet shank shall be bent cold, and hammered until the two parts of the shank touch in the manner shown in Fig. 13. There shall be no fracture on the outside of the bend.

7.2.2 *Flattening Test* — The rivet head shall be flattened, while hot, in the manner shown in Fig. 14. The head shall be flattened until its diameter is 2½ times the diameter of the shank. There shall be no cracking at the edges.

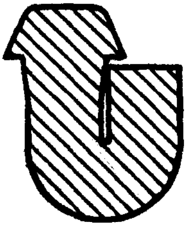


FIG. 13 BEND TEST

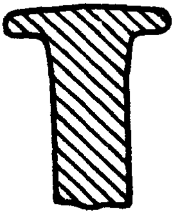


FIG. 14 FLATTENING TEST

8. MARKING

8.1 Such marks as may be specified by the purchaser shall be stamped (raised or sunk) during the process of manufacture on the head of all rivets.

8.1.1 The packages containing the rivets may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

9. GENERAL SUPPLY CONDITIONS

9.1 The general requirements for the supply of rivets shall be in accordance with *IS : 1387-1959 General Requirements for the Supply of Metals and Metal Products.

10. PRESERVATION AND PACKING

10.1 Preservation — Unless the purchaser has specified specific treatment at the time of enquiry or at the time of placing the order, the rivet shall be supplied in a well-cleaned condition and suitably protected against rust in a manner which is left to the discretion of the manufacturer.

10.2 Packing — The rivets shall be packed in accordance with the best trade practice.

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* Since revised.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg.m/s
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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